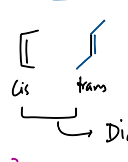
Organic jan 10

Saturday, January 7, 2023 10:46 AM

All Geometrical isomers are diastereomers But reverse is not true.

Diastereoisomers → Two stereoisomers which are not mirror images of each other.

eg 

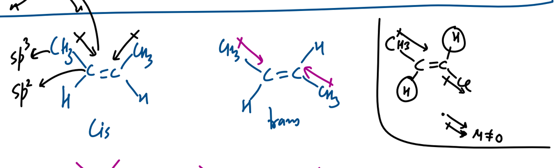
Cis, trans → Diastereomers

Can be seperated on the Basis of difference in Physical properties.

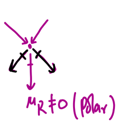
eg If they have Different Boiling points, they Can be seperated by fractional Distillat^n technique.

Similarly, they can be seperated by Fractional Crystallization technique.





%S ∝ EN

Dipole moment  > $\mu_R = 0$ (Non-polar)

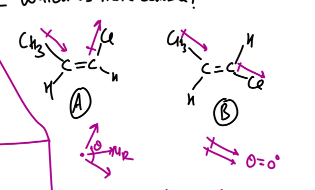
$\mu_R \neq 0$ (Polar)

Boiling point (BP ∝ μ)	C	>	T
M.P (M.P ∝ Symmetry)	C	<	T
Stability	C	<	T
Solubility in H_2O ∝ μ	C	>	T

C → has more Steric repulsion or Steric Hindrance or Steric Crowding

$\mu \propto \frac{1}{\theta}$

Q. Which is more Soluble?

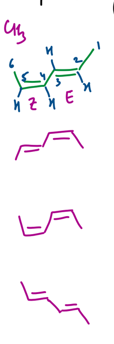


A < B (μ & solubility in H_2O)

Total No. of Geometrical Isomers

1) $CH_3-CH=CH-CH=CH-CH_3$ → Compound is symmetric about this mirror plane

2(E), 4(Z) – Hexa-2,4-diene



C	T
T	C
C	C
T	T

Same (C T / T C)

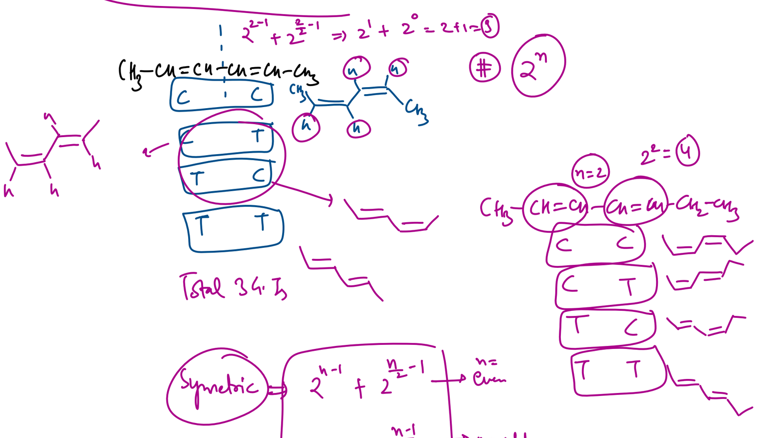
(n=2), $2^{2-1} + 2^{\frac{2}{2}-1} = 2+1 = 3$

So, Total G.Is = 3

If Symmetric Compound is present, Total G.Is = $2^{n-1} + 2^{\frac{n}{2}-1}$ ⇒ n = even

" = $2^{n-1} + 2^{\frac{n-1}{2}}$ ⇒ n = odd

n ⇒ no. of double Bonds about which G.I is possible



2^n

Symmetric ⇒ $2^{n-1} + 2^{\frac{n}{2}-1}$ → n = even; $2^{n-1} + 2^{\frac{n-1}{2}}$ → n = odd

$CH_3-CH=CH-CH=CH-CH=CH_2$ — Asymmetric ⇒ 2^n is Total no. of G.I

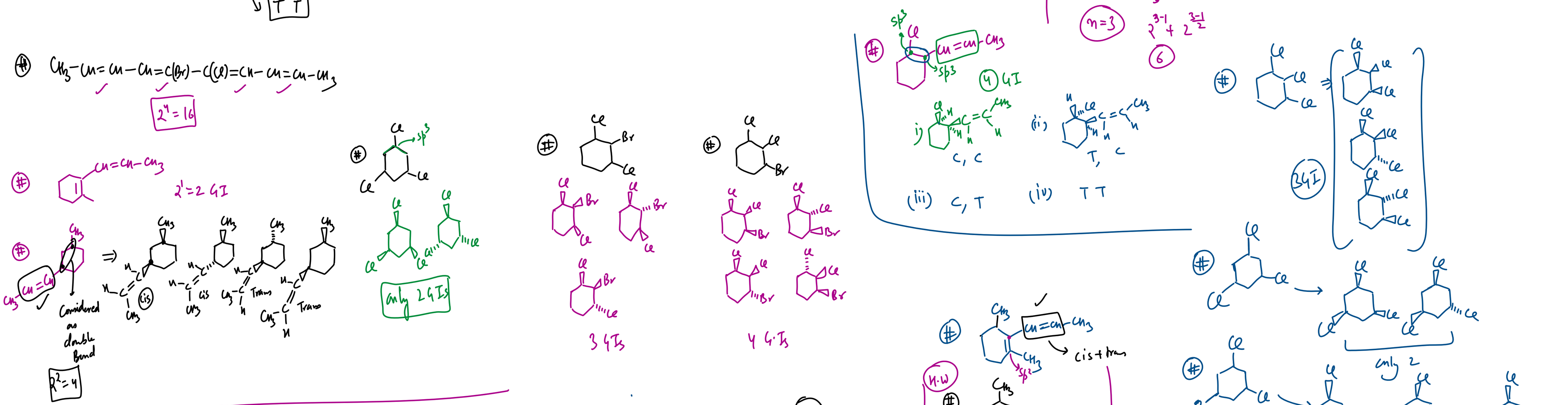
n=2, $2^2 = 4$ G.I → C T, T C, C C, T T

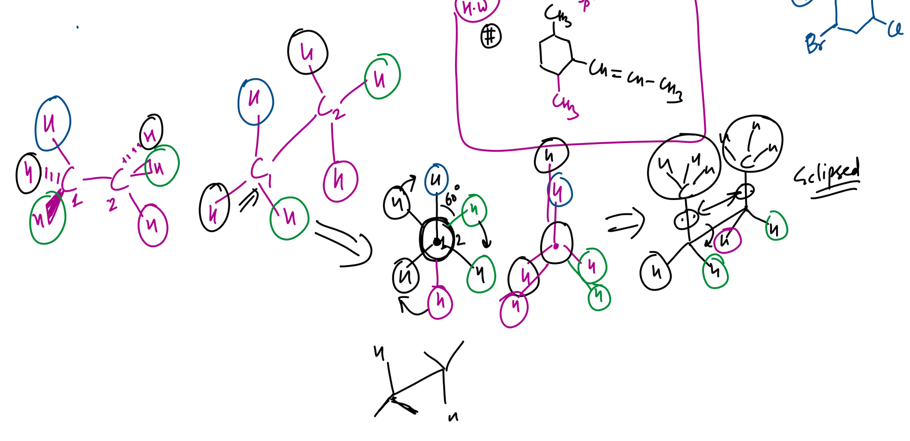
$CH_3-CH=CH-CH=CH-CH=CH_2$ $2^2 = 4$

$CH_3-CH=CH-CH=C(Br)-C(Cl)=CH-CH=CH-CH_3$ $2^4 = 16$

$CH_3-CH=CH-CH=C(Br)-C(Cl)=CH-CH=CH-CH_3$ $2^4 = 16$

$CH_3-CH=CH-CH=CH-CH=CH-CH_3$ (n=3) $2^{3-1} + 2^{\frac{3-1}{2}}$ = 6





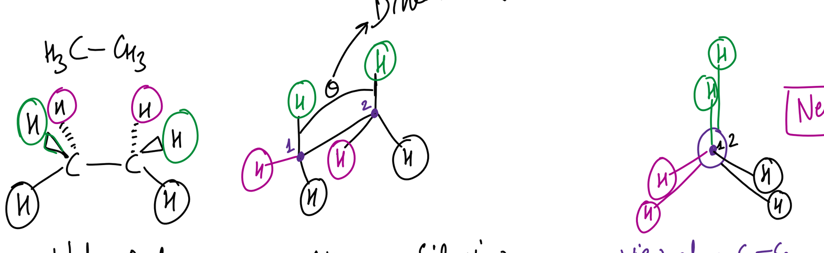
Conformational Isomerism

↳ Rotation about C–C (Single Bond) results into different arrangements & due to these arrangements, we get distinct compounds called Conformations or rotamers.

✓ Rotational Barrier about C–C (single) is very less which can be easily overcome at Room temp.

✓ No. of Conformations possible are infinite.

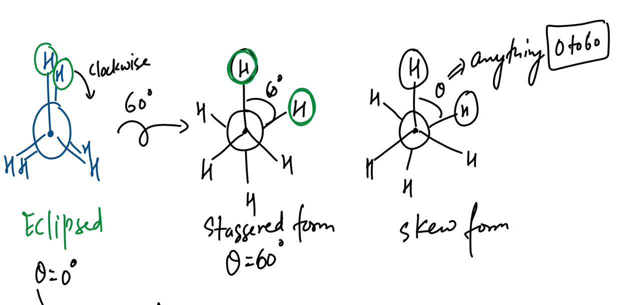
eg Conformations in Ethane



Carbon 2 will be behind Carbon 1

Carbon 2 (Rear or Behind) → Take as Ball

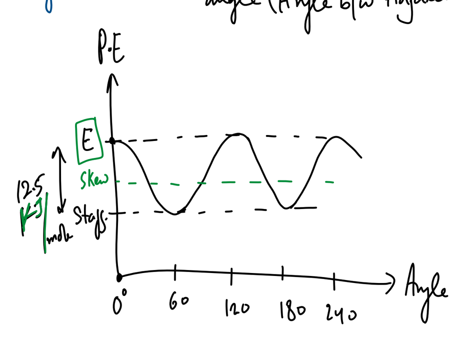
Carbon 1 (Front) → Take as Dot



Eclipsed θ=0° → Dihedral angle (Angle b/w Adjacent Bonds)

Staggered form θ=60°

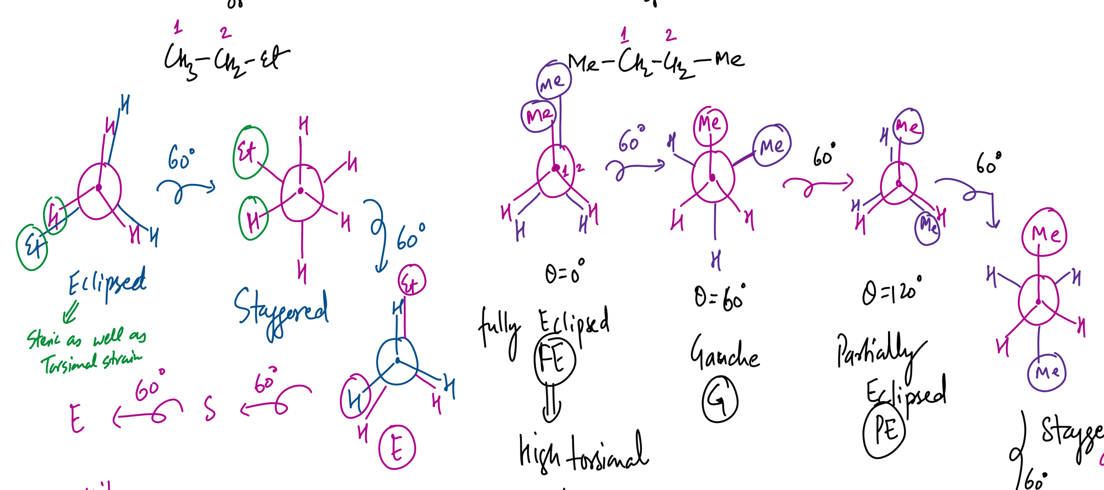
Stability: Stag > Skew > Eclipse



Conformation in Butane

$CH_3-CH_2-CH_2-CH_3$ or CH_3-CH_2-Et

$CH_3-CH_2-CH_2-CH_3$ or $Me-CH_2-CH_2-Me$

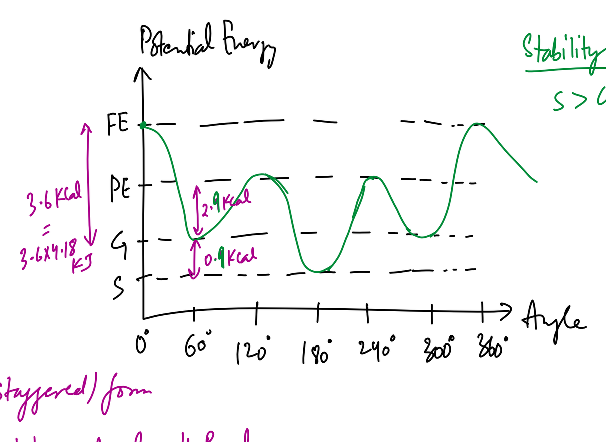


stability E < S

FE → high torsional and Steric strain Which ↑es Energy of FE form

FE ← G ← PE

Page 35 Read & write
- Torsional Strain
- Steric strain



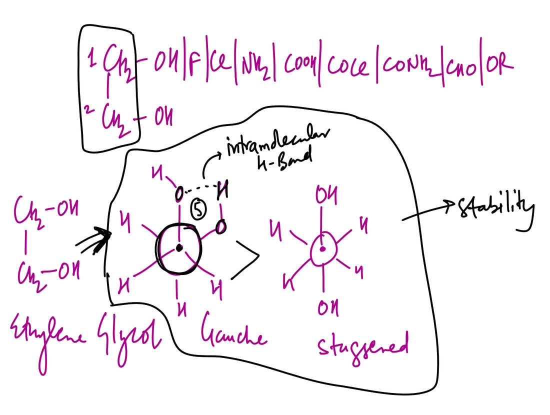
Stability: S > G > PE > FE

Note

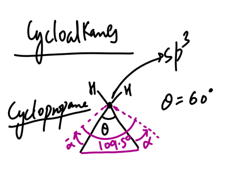
Gauche or skew is less stable than Anti (Staggered) form But in following cases G > S (Stable) due to intramolecular H-Bond ↳ Attractive interaction

$^1CH_2$–OH|F|Cl|NH_2|COOH|COCl|$CONH_2$|CHO|OR

$^2CH_2$–OH



Cycloalkanes



Baeyer's Angle Strain (A.S) $(\alpha) = \frac{109°28' - \theta}{2}$

$\theta = 180 - \frac{360}{n}$ (n → no. of sides)

$\alpha = \frac{109°28' - 60°}{2} = \frac{49°28'}{2} = \frac{48°88'}{2} = 24°44'$

Square (90°): $\alpha = \frac{109°28' - 90°}{2} = 9°44'$

Pentagon (θ=108°): $\alpha = 44'$

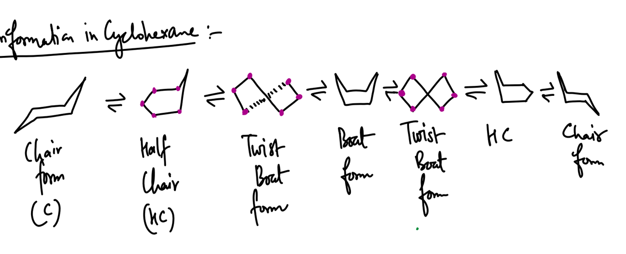
Hexagon (θ=120°): $\alpha = \frac{109°28' - 120}{2} = -5°44'$

–ve A.S ⇒ internal twisting to get relief from A.S

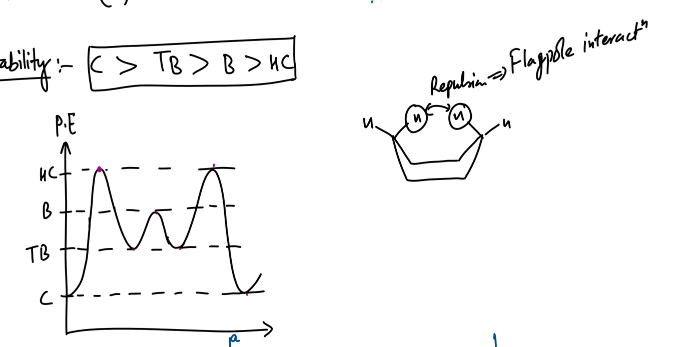
+ve A.S ⇒ Ring will Break to relieve from A.S

Stability ⇒ hexagon > pentagon > square > triangle (hexagon, pentagon: Stable & Used as Solvent; square, triangle: Reactive)

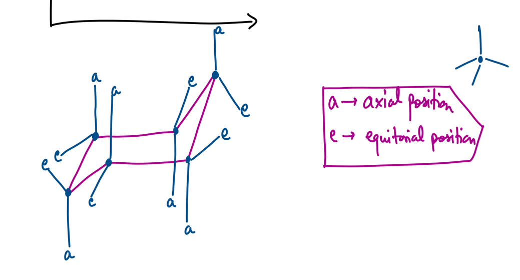
Conformation in Cyclohexane :-



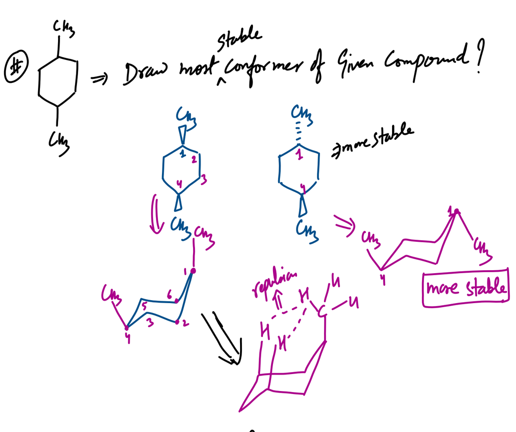
Stability :- C > TB > B > HC



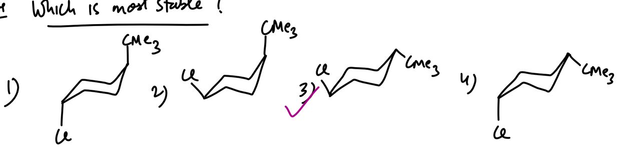
#



1,4-dimethylcyclohexane ⇒ Draw most stable Conformer of Given Compound?

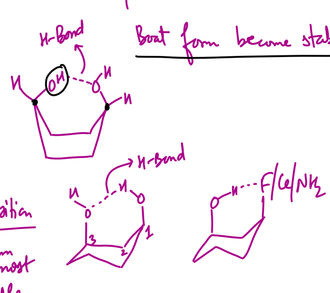


Q. Which is most stable?

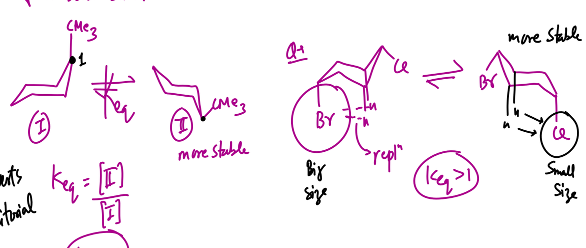


1,4 position ⇒ Usually Chair form containing Both Groups at Equitorial most Stable But Boat form become stable when intra H-Bond Exist.

1,3 position — Chair form most Stable with Both Group at axial position if H-Bond Exist.

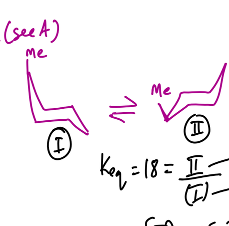


Q. on flipping the ring axial converts into equitorial



$K_{eq} = \frac{[II]}{[I]}$, $K_{eq} > 1$; $K_{eq} > 1$

Solve Q-3 (see A)



$K_{eq} = 18 = \frac{II}{(I)}$ → 18x / x

[II] = 18[I]

% of I = $\frac{x}{19x} \times 100$ ≈ 5%